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U1S S1156 S1935

(56) Documents Cited
GB 2242364 A **WO 93/10864 A1** **WO 93/06899 A1**
US 5316293 A **US 5066011 A** **US 4043076 A**
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(58) Field of Search
UK CL (Edition O) **A6D D4 , F4R RAG**
INT CL^6 **A63B 43/06 , F21V 33/00**

(54) Illuminated article

(57) An illuminated article comprises a casing and within that casing, a switch that responds to a sensed impact or a change in direction, a battery and light generating means. The article is preferably a silicone rubber ball. The battery can be rechargeable and the article can be provided with terminals to permit recharging. The article and the recharger can be put together to make an article that emits light while it is being charged.

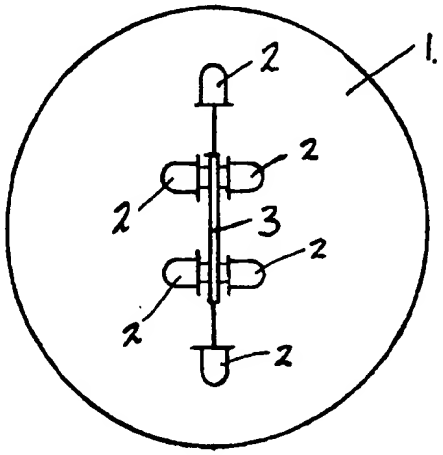

Fig.1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

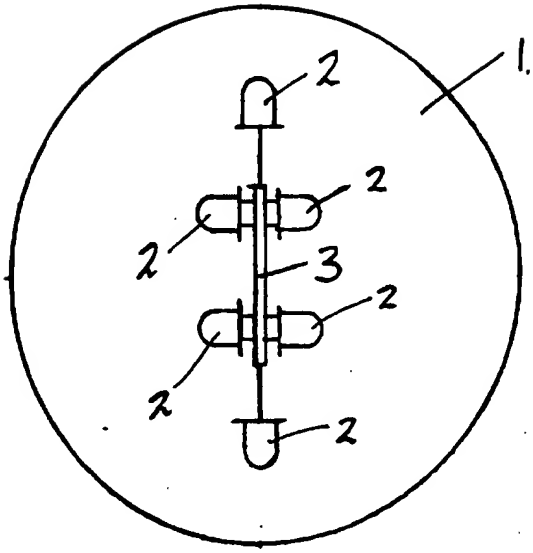

Fig. 1

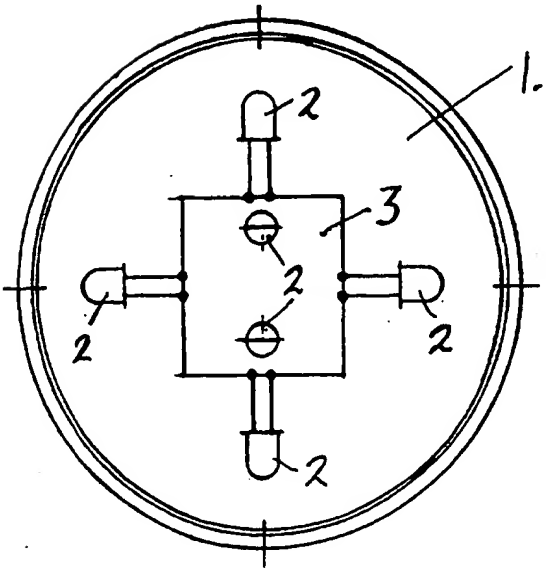

Fig. 2

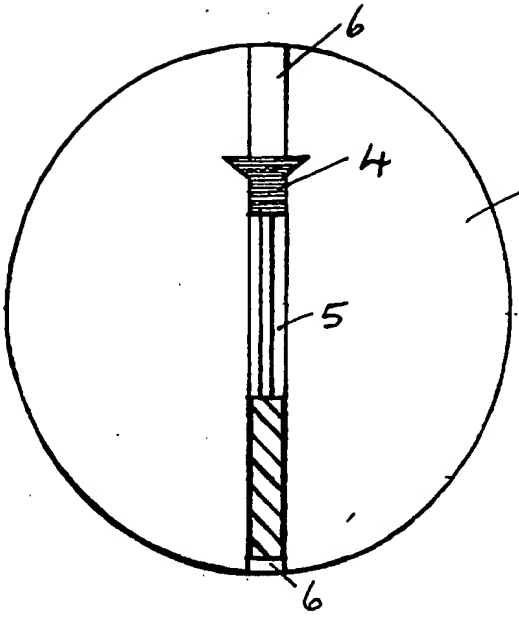

Fig. 3

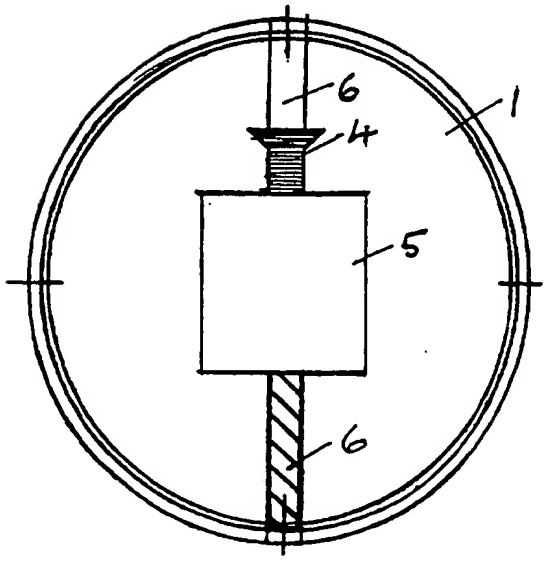

Fig. 4

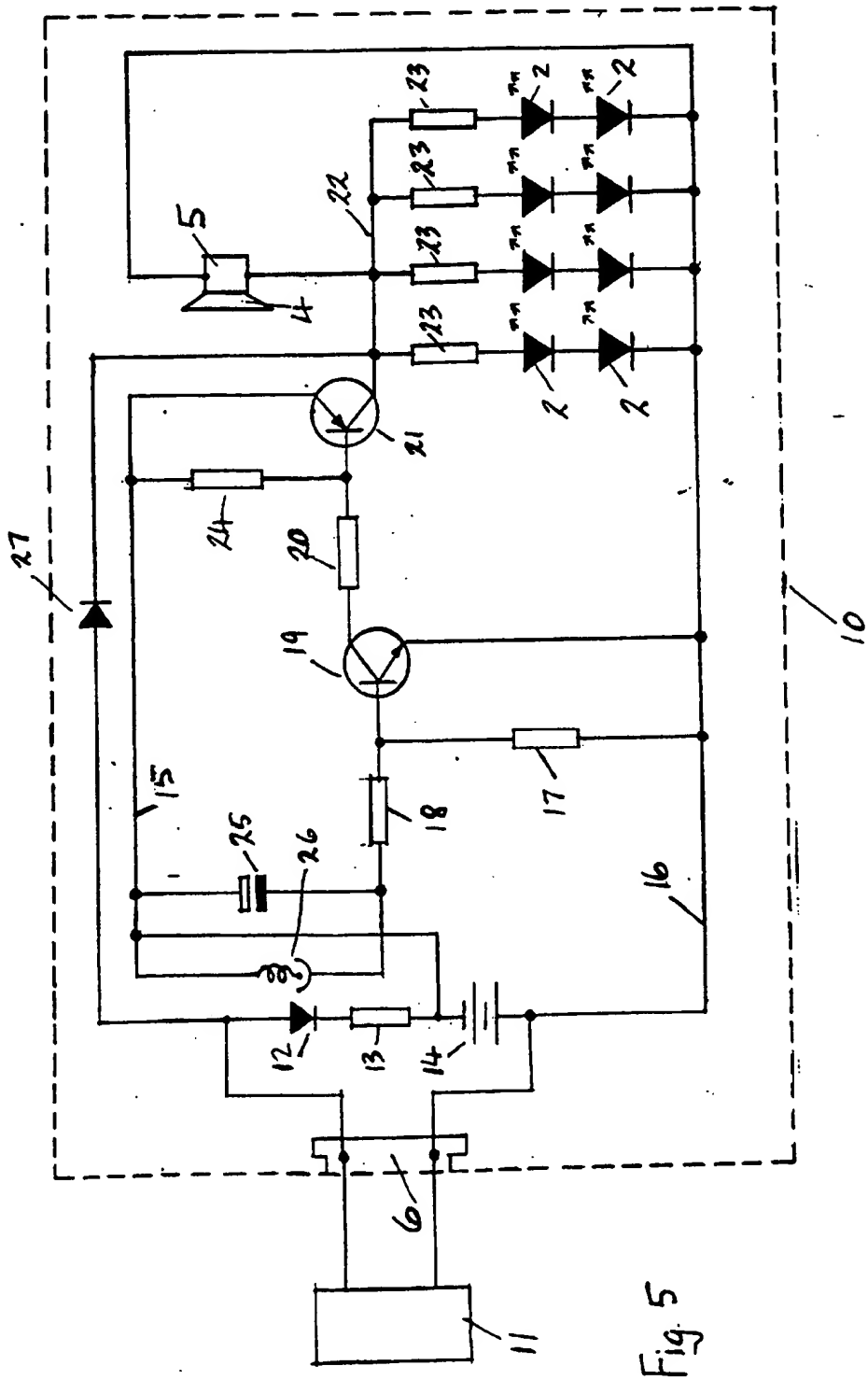

Fig. 5

LUMINOUS DEVICE

This invention relates to illuminatable objects.

In accordance with a first aspect of this invention, there is provided a luminous device comprising a casing capable of withstanding an impact or rapid direction change, a switch completely enclosed within the casing and operated by the impact or direction change, one or more light generating members enclosed within the casing for illuminating the latter as a consequence of the impact, and a battery and circuit controlled by the switch in order to energize the light member(s).

In accordance with a second aspect of this invention, there is provided a luminous device in the form of a ball with a body and casing of material enabling the ball to be bounced, said device comprising a switch in a circuit and completely enclosed within the casing and operated by the bouncing of the ball, one or more light generating members completely enclosed within the casing for illuminating at least part of the latter when the light members are energized, and a battery connected to the switch circuit for energizing the light member(s) when the switch is operated.

In accordance with a third aspect of this invention, there is provided a luminous device comprising an outer casing having at least part thereof capable of withstanding a predetermined degree of impact, a switch in a circuit and completely enclosed within the casing, said switch being designed to be operated by the said impact, one or more light generating members for illuminating the casing or part thereof when the member(s) is energized, a battery connected to the switch circuit for energizing the light member(s) when the switch is operated.

In the accompanying drawings is illustrated a ball representing one embodiment of the present invention.

Fig. 1 is a side elevational view through one part of one embodiment form of the ball;

Fig. 2 is a plan elevational view through the same part of the ball;

Fig. 3 is a side elevational view through another part of the same ball;

Fig. 4 is a plan elevational view through the other part of the same ball; and

Fig. 5 is a circuit diagram of the electronic circuitry involved in the operation of lights and sonic apparatus in other embodiments of the ball, or device.

The ball described in Figs. 1 to 4 is made as a one-piece object of silicone rubber with the circuit shown in Fig. 5 including lights in the optional form of LED's and with or without sonic equipment in the interior of the ball. A re-chargeable battery or batteries to power the lights and other equipment is also

included in the said interior, and connections are provided on the exterior of the ball for re-charging purposes.

The silicone rubber enables the ball to be bounced around, and upon bouncing, a switch such as a trembler switch, operates and illuminates the ball.

The latter can be a football, a tennis ball or other form of toy ball, or an item of display in which the item or object is illuminated by an impact. The word impact is intended to include within its meanings a sudden change in the direction of movement of the ball such as the act of kicking a football. Another meaning of impact is the sudden stopping of the movement of an object, a sudden blow to an object such as by striking it against another item of object or vice versa thereby operating the trembler switch and thereby illuminating the object.

It is to be appreciated that the invention can be embodied in many forms of objects other than bouncing balls. Various forms of lamps with Fig. 5 circuitry incorporating therein can be switched on by an impact thereby operating the lights and optionally the sonic equipment.

The object can be any item of display which can be illuminated from within by an impact which will be sufficient to operate the trembler switch. The display can be in the form of a trophy which can be placed upon a stand incorporating a charging circuit for the re-chargeable batteries in the circuitry inside the trophy. The display can alternatively be in the form of a night light which is continuously illuminated over night whilst the charging is being conducted.

The object or ball can be formed in two parts if required in order to provide access to the interior of the object to correct or adjust the circuitry, replace lights, batteries etc. The two parts can be screwed together with mating threads in the case of a ball, or clamped together by screws or the like.

In Figs. 1 to 4 the ball is of one-piece construction and thus the only control which can be exercised over the circuitry etc., is the re-charging of the batteries by an external charging mechanism, which will be described hereinafter.

In Figs. 1 and 2, the ball 1 is substantially solid and is of silicone rubber. Illumination upon impact is provided by the eight LED's 2 disposed in and encapsulated in the material of the ball. Circuitry arrangement 3 is also encapsulated in the material of the ball, and is connected to and supports the LED's as shown in Figs. 1 and 2. Some of the LED's are shown near to the outer surface of the ball, and providing they are undamaged by the impact, that can have the advantage of providing greater illumination. Providing the material of the ball is reasonably transparent, however, they can alternatively be well embedded in the ball for

protection purposes. If coloured illumination is desired then the LEDs can be coloured to emit light of any desired colour, or filters on or in the ball can be used to provide the desired colour(s). Upon impact, the LED's can permanently remain energized or they can be illuminated for any desired interval by means of a timing circuit to be described.

In addition to the illumination, the ball can also be arranged to simultaneously produce upon impact sound such as continuous tone from a buzzer, or such as a message from a loudspeaker 4 of a sound recorder shown in Figs. 3 and 4. A channel 6 is provided to facilitate transmission of the sound to outside of the ball, and is also provided as an entry point into the ball for battery re-charging purposes.

The circuitry contained within the dotted line 10 of Fig. 5 is contained, within the ball and upon charging is connected to charging circuit 11 via the channel 6. The charging circuit 11 comprises a transformer connectable to an a.c. 220 volts supply and for supplying a 12 volt output therefrom. The 12 volt output is applied to the charging input terminals 6 of the ball and across a rectifier 12, in series with a resistor (270Ω) and a 9 volt re-chargeable sealed lead acid battery. One side of the battery 14 is connected to a lead 15, and the other side of the battery is connected to the lead 16. The latter is connected via a resistor (100k) 17 to one side of a resistor 18 and to the base of a transistor (BC108) 19. The emitter of transistor 19 is connected to lead 16, and the collector is connected via a resistor 20(47k) to the base of a transistor 21. The emitter of the latter is connected to the lead 15 and the collector to a lead 22. The latter is connected to pairs of high brightness LEDs 2 connected in series via resistors (120Ω) 23 to the lead 16. The base of transistor 21 is connected to the lead 15 via a resistor (10k) 24. The other side of the resistor 18 is connected to one terminal of a capacitor (100μF) 25 whose other side is connected to the lead 15. The capacitor forms a timing circuit to determine the duration of illumination due to the impact, which duration is fixed in a solid ball and adjustable in an openable ball. The switch 26 is preferably a trembler switch is closed upon the said impact, and is connected across capacitor 25. The loudspeaker 4 and audio circuitry 5 is connected between leads 22 and 16, and a rectifier 27 is connected between rectifier 12 and lead 22.

Battery 14 is a 9 volt 110 mA re-chargeable battery, and 9 volts at 11mA is suppled thereto by the charging circuit which is applied to the ball after use, in order to re-charge it for future use. Airflow is provided in the ball for any gases that may be generated, and such airfow can be to the exterior of the ball.

Upon impact, such as bouncing of the ball, the trembler switch is closed and that activates the timer circuit comprising capacitor 25, resistor 18 and resistor 17 which are connected in series across the battery 14. Transistor 19 is thereby actuated and that in turn activates transistor 21 via resistors 20 and 24.

That in turn provides a circuit to the LEDs 2, via resistors 23, and that enables the LED's to illuminate. The period during which the LED's remain illuminated is determined by the size of the capacitor 25 in the charging circuit. That capacitor can be varied in the case of an openable ball, but is fixed for a fully sealed ball. Diode 27 provides power for the LED's during re-charging of battery 14, thereby providing a night light display. Diode 27 also prevents unwanted feedback.

In the embodiments in which a sound system is required, the speaker sound module 5 is switched on upon the operation of transistor 21, namely at the same time that the LED's are switched on. Sound signals are provided for a set period, such as 10 secs; by means of a timer arrangement in the module 5. The latter is an encapsulated chip and incorporates all of the circuitry necessary to drive a pre-programmed I.C.

The illuminatable object can be in other forms such as a table lamp encapsulating the circuitry of Fig. 5 within its casing. The ball can be put on a stand or form the top of a table lamp, and the re-charging arrangement 11 can be formed in the stand or the base of the lamp.

The circuit of Fig. 5 can optionally include in the timing circuit, a flashing circuit enabling the LED's with or without the audio arrangement to be intermittently interrupted to provide flashing or interruption of the lights and also optionally the sound.

The external casing of the ball or object can have displays thereon or they can be comprised of different filters to form a desired pattern.

Claims:

1. A luminous device comprising a casing capable of withstanding an impact or rapid direction change, a switch completely enclosed within the casing and operated by the impact or direction change, one or more light generating members enclosed within the casing for illuminating the latter as a consequence of the impact, and a battery and circuit controlled by the switch in order to energize the light member(s).

2. A luminous device in the form of a ball with a body and casing of material enabling the ball to be bounced, said device comprising a switch in a circuit and completely enclosed within the casing and operated by the bouncing of the ball, one or more light generating members completely enclosed within the casing for illuminating at least part of the latter when the light members are energized, and a battery connected to the switch circuit for energizing the light member(s) when the switch is operated.

3. A luminous device comprising an outer casing having at least part thereof capable of withstanding a predetermined degree of impact, a switch in a circuit and completely enclosed within the casing, said switch being designed to be operated by the said impact, one or more light generating members for illuminating the casing or part thereof when the member(s) is energized, a battery connected to the switch circuit for energizing the light member(s) when the switch is operated.

4. A device according to claim 1, 2 or 3, further comprising a timing arrangement for switching off the light members a predetermined period after operation of the members.

5. A device according to claim 4, further comprising a flashing arrangement for permitting intermittent interruption of the illumination during the said predetermined period.

6. A device according to claim 5 or 6, further comprising an audio arrangement from which audible signals are produced during the said predetermined period.

7. A device according to claim 6, wherein the audible signals are in the

form of a pre-recorded message.

8. A device according to any one preceding claim, wherein the light members are LED's.

9. A device according to claim 8, wherein the LED's are arranged to transmit one or more coloured lights from the object.

10. A device according to any one preceding claim, wherein the battery or batteries is/are re-chargeable.

11. A device according to claim 10, wherein a part of a recharging circuit is provided inside the object/ball and enables the object/ball to be used as a lamp or display during re-charging.

12. A toy substantially as hereinbefore described with reference to the accompanying drawings.

The Patent Office

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Application No:	GB 9518776.1	**Examiner:**	Alan Blunt
Claims searched:	1 to 12	**Date of search:**	4 December 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): A6D (D4); F4R (RAG)

Int Cl (Ed.6): A63B 43/06; F21V 33/00

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	GB2242364A	(DOWDEN) - page 1 (list of uses)	1 to 12
X,Y	WO93/10864A1	(I & K TRADING) - whole document	X 1 to 12 Y 1 to 12
X	WO 93/06899A1	(MALEYKO) - figure 7	10,11
X,Y	US5316293	(HAMILTON) - whole document	X 1 to 12 Y 1 to 12
X,Y	US5066011	(DYKSTRA) - whole document	X 1 to 12 Y 1 to 12
X,Y	US4043076	(POTRZUSKI) - whole document	X 1 to 12 Y 1 to 12
X,Y	US3580575	(SPEETH) - whole document	X 1 to 12 Y 1 to 12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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